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(54) **Liquid applying device**

(57) A liquid applying device comprises an outer tube 11 and a cartridge 12 to be charged with a predetermined amount of liquid material L. The liquid material in the cartridge is speedily fed to a front tip 15 through a feed core 31 having a fine rod shape and a liquid material retaining member 20 by means of the capillary phenomenon. The liquid amount contained in the cartridge significantly corresponds to the liquid retaining abilities of the feed core and retaining member, whereby the entire liquid content in the cartridge is speedily fed, thus to effectively prevent the liquid material from dripping in use of the liquid applying device. Air passage means 19, 23 (See Figure 1) is also provided.

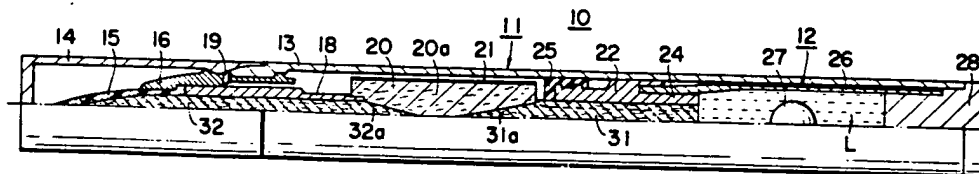


FIG. 2

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LIQUID APPLYING DEVICE

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5 This invention relates to a device for applying
liquid material and, more particularly, to a device in
which a liquid material such as makeup material, ink or
the like contained in a disposable cartridge filled with
a predetermined amount thereof is speedily fed and
10 impregnated into a liquid material feed core and a liquid
material retaining member for the purpose of preventing
the liquid material from dripping in drops.

15 A device for applying a liquid such as liquid makeup
material generally comprises a front tip for applying the
liquid material to an object and a feed core for
supplying the liquid to the applying tip by capillary
action.

20 In one example of a conventional disposable liquid
makeup material applying device in which a predetermined
amount of the liquid makeup material is preliminarily
impregnated, when the device has been stored for a long
time without use, the makeup material is liable to become
denatured or the applying tip is apt to become unusable
25 in a dried condition.

 In order to overcome these problems, the prior art
has further provided a liquid makeup material applying

device utilizing a cartridge in which a spare cartridge filled with a predetermined amount of the liquid makeup material is connected to a body of the device when it is to be used.

5 The liquid applying device of this type, however, entails a problem in that the liquid material is liable to drip in drops when the cartridge is connected to a liquid material retaining member of the applying device with the front tip downwardly directed for the reason
10 that the cartridge is warmed by the temperature change in the environment such as body temperature of a user and that the air in the cartridge accordingly tends to expand. The liquid applying device of this type further
15 is accompanied by a problem in that it takes much time for the device to become usable after the charging of the spare cartridge, that is, for the liquid to be supplied to the front applying tip, whereby the device is not handy and convenient in use.

The present invention provides a device for applying a liquid material comprising an outer barrel tube constituting a main body of the device and a cartridge to be charged therein with a predetermined amount of a liquid material wherein a feed
5 core is accommodated in the barrel tube and adapted to be impregnated with the liquid material, the feed core being provided with a front tip for applying the liquid material on an object, a liquid material retaining member is mounted around an axially intermediate portion of the feed core to retain the
10 liquid material in an impregnated state, the rear end portion of the feed core is held by a feed core holder to the rear end of which is connected the cartridge which has an inner volumetric space capable of retaining a predetermined amount of the liquid material corresponding to an amount thereof which is retainable
15 in the feed core and the liquid retaining member in the impregnated state, and the front end of the barrel tube is detachably sealed by a cap.

According to the liquid applying device having the construction described above, the liquid retaining member

is mounted around the feed core at the axially intermediate portion thereof, and the entire amount of the liquid material contained in the cartridge can be fed and impregnated into the retaining member and the feed core
5 in a very rapid manner when the device is used, so that there can be substantially no dripping of the liquid in drops.

In a preferred embodiment, the feed core comprises first and second core members which have opposing needle-
10 like sharp ends to be inserted into the liquid retaining member in mutual alignment, whereby the impregnation speed of the liquid material from the core member to the liquid retaining member or vice versa can be remarkably facilitated by capillary action. Thus, the time for the
15 device to become usable is considerably shortened, whereby the device is handy and convenient.

The preferred embodiments of this invention will be described in greater detail hereinafter with reference to the accompanying drawings.

20

In the accompanying drawings:

FIG. 1 is a longitudinal sectional view of one embodiment of a liquid applying device according to this invention;

25 FIG. 2 is also a longitudinal sectional view of another embodiment of a liquid applying device according to this invention; and

FIG. 3 is also a longitudinal sectional view of a further embodiment of a liquid applying device according to this invention.

5 FIG. 1 is a longitudinal sectional view of a liquid makeup material applying device as one example embodying a liquid applying device according to this invention.

Referring to FIG. 1, a liquid makeup material applying device 10 generally comprises a cylindrical body 11 of the applying device 10 and a cartridge 12 mounted in the body 11. The body 11 comprises an outer fine barrel tube 13, to the front end of which a cap 14 is detachably fitted. A makeup material applying member of tip type 15 (called hereinafter applying tip), which is held in the barrel tube 13 via a holder 16, is made of a porous soft material such as polyurethane foam or sponge in a preferred embodiment. The applying tip 15 has an inner hollow portion 15a of cone shape serving as a receiving hole into which the front end of a feed core 17 for feeding the makeup material to the applying tip 15 is to be inserted. The feed core 17 is made of a porous resin such as polyester resin or acrylic resin and formed into a rod shape extending axially in the body 11, and a press sleeve 18 is mounted near the front end of the feed core 17 and substantially inward of the holder 16. The holder 16 has a bore 19 through which the interior of the

barrel tube 13 communicates with the outside atmosphere with the cap 14 removed.

A liquid makeup material retaining member 20 is mounted on and around an axially intermediate portion of the feed core 17 in such a manner that the feed core 17 penetrates the liquid makeup material retaining member 20, which is constituted by, for example, polyester fibers or aclyric fibers 20a formed into a fleecy material and an outer coat film 21 made of a moisture-proof cellophane or polypropylene so as to retain the liquid makeup material in the impregnating member 20a.

A core holder 22 for holding the feed core 17 in the barrel tube 13 is disposed by a press-fit manner at an axially rear portion of the location of the retaining member 20. The core holder 22 is provided with an inner axial hollow portion 22a through which the rear portion 17b of the feed core 17 extends rearwardly. A plurality of, for example, four, ribs 22b are formed on the inner circumferential wall of the core holder 22 so as to project inwardly, and axial air passages 23 are formed between these ribs.

A packing 25 is mounted on the front end of the core holder 22 to seal the rear portion of the barrel tube 13. When the cap 14 is fitted onto the front end of the body 11, the air hole 19 is closed and the interior of the barrel tube 13 is sealed. To the rear end of the core

holder 22 is disposed a connecting member 24 through which the feed core 17 and a cartridge 12 are connected.

5 The cartridge 12 comprises a cylindrical case 26 having a rear end closed by a plug 28 and a front end closed by a thin lid, not shown, when the cartridge 12 is unused. A predetermined amount of the liquid makeup material is contained in the closed case 26, and a ball 27 is also accommodated therein for the purpose of agitating the contained makeup material. According to 10 this construction, when it is required to use the makeup material applying device 10, the front end of the cartridge 12 is inserted into the connecting member 24 of the core holder 22, and the front thin lid is broken or removed thereby to feed the entire amount of the makeup 15 material contained in the cartridge 12 through the feed core 17 toward the applying tip 15. The entire amount of the makeup material to be contained in the cartridge is determined to be slightly less than but substantially equal to the total amount thereof to be retained, by 20 impregnation, in the feed core 17, the retaining member 20 and the applying tip 15.

The body 11 of the applying device 10 and a spare cartridge 12 are stored separately under unused condition. At the time of use thereof, the cartridge 12 25 is forcibly inserted into the connecting member 24 of the core holder 22 as described above in a state shown in FIG. 1.

Upon inserting the cartridge 12, the liquid makeup material L contained in the cartridge 12 is immediately fed to the feed core 17, the retaining member 20 and the applying tip 15 in this order by capillary phenomenon

5 through the feed core 17 to assume a usable condition.

Under this condition, the interior of the cartridge 12 becomes empty, so that the dripping of the makeup material through the applying tip 15 can be substantially

10 prevented even if the applying device 10 is positioned with the front end thereof downwardly directed or even if the cartridge 12 is warmed by an environmental temperature change, and of course, this advantageous effect is associated with the location of the air hole 19 and air passages 23.

15 Another preferred embodiment of the liquid makeup material applying device of this invention will be described hereunder with reference to FIG. 2 in which like reference numerals are assigned to members or elements corresponding to those of the applying device 10
20 shown in FIG. 1.

In the embodiment of the invention shown in FIG. 2, the feed core comprises two members, i.e., a first feed core member 31 and a second feed core member 32 which are
25 separated in the location of the makeup material retaining member 20, whereas the feed core 17 in the aforementioned embodiment comprises a single unitary rod like member. The first feed core member 31 disposed on

the side of the cartridge 12 has a sharp needle-like front end 31a, and the second feed core member 32 disposed on the side of the applying tip 15 has a sharp needle-like rear end 32a. The front and rear sharp ends 31a and 32a are inserted into the impregnation material 20a in a stuck state in axial alignment with each other. These front and rear ends 31a and 32a may or may not be in contact with each other in the impregnation material 20a.

In the use of the embodiment of the invention shown in FIG. 2, the liquid makeup material L contained in the cartridge 12 is fed, by impregnation, into the first feed core 31 and then into the impregnation material 20a through the sharp front end 31a of the first feed core

member 31. Since the sharp front end 31a contacting the impregnation material 20a in the retaining member 20 has a surface area larger than the surface area of the bar like portion such as the feed core 17 of the first embodiment of the invention described with reference to FIG. 1 and, in addition, the impregnation speed at the central portion of the bar like feed core is high, the liquid makeup material L can be rapidly impregnated into the liquid impregnation material 20a of the retaining

member 20 by capillary phenomenon in association with the air pressure through the air passage 23. Accordingly, the makeup material applying device becomes usable in a short time after the insertion of the cartridge, and the

applying tip can be amply filled with the liquid makeup material in a short time. In repeated experiments, the cartridge filled with the liquid makeup material in an amount of 1 to 2 cm³ was made empty only for about 10 to
5 40 seconds for the impregnation thereof with substantially no dripping thereof from the applying tip.

FIG. 3 is an illustration of a further embodiment of the liquid makeup material applying device according to this invention, in which like reference numerals are
10 assigned to elements or members corresponding to those shown in FIG. 1 or 2.

Referring to FIG. 3, the first feed core member 31 is designed to be cylindrical with a diameter d_1 larger than the diameter d_2 of the second feed core member 32.
15 According to this design, the liquid makeup material L in the cartridge can be impregnated into the retaining member 20 in a time shorter than that required with respect to the second embodiment of the invention shown in FIG. 2 after the insertion of the spare cartridge into
20 the device body 11.

In a preferred modification, the applying tip may be eliminated by sharply forming the front end of the feed core to serve as a liquid applying end.

Furthermore, this invention can be utilized for various kinds of writing utensils such as soft-touch pens, signing pens, and writing and painting brushes by using cartridges filled with ink or the like writing liquid material.

5 The preferred embodiments of the present invention can reduce drawbacks or problems encountered in the prior art in this technical field and to provide an improved device for applying a liquid material capable of preventing the liquid material from dripping in drops.

10 The preferred embodiments of the present invention can also provide a device for applying a liquid material contained in a cartridge in which the liquid material is speedily fed to a front applying tip in a short time.

15 The preferred embodiments of the present invention can additionally provide a device for applying a liquid material in the form of a liquid cosmetic makeup material applying device.

CLAIMS:

1. A device for applying liquid of the type comprising an outer barrel tube constituting a main body of the device and a cartridge to be charged therein with a predetermined amount of a liquid material, wherein a feed core (17) is accommodated in said barrel tube (11) and adapted to be impregnated with the liquid material, said feed core being provided with a front tip (15) for applying the liquid material on an object, a liquid material retaining member (20) is mounted around an axially intermediate portion of said feed core to retain the liquid material in an impregnated state, the rear end portion of the feed core is held by a feed core holder (22) to the rear end of which is connected the cartridge (26) which has an inner volumetric space capable of retaining a predetermined amount of the liquid material corresponding to an amount thereof which is retainable in the feed core (17) and the liquid retaining member (20) in the impregnated state, and the front end of the barrel tube (11) is detachably sealed by a cap (14).

2. A liquid applying device according to claim 1 wherein said liquid material retaining member (20) comprises a cylindrical impregnation member (20a) mounted around said feed core (17) and a shell member (21) for

covering an outer peripheral surface of the impregnation member.

3. A liquid applying device according to claim 2 wherein said impregnation member (20a) is made of a resin such as polyester resin and said shell member (21) is made of a moisture-proof material.

4. A liquid applying device according to any of the preceding claims wherein said feed core (17) is made of a porous resin such as polyester resin in the form of a fine rod.

5. A liquid applying device according to any of the preceding claims wherein said core holder (22) is provided with an inner hollow portion into which the rear end portion of said feed core (17) is inserted and provided with rib means formed on an inner circumferential surface of the inner hollow portion for defining an air passage (23) between the feed core and the core holder when the rear end portion of the feed core is inserted into the hollow portion of the core holder.

6. A liquid applying device according to claims 1, 2, 3 or 4 wherein said feed core (17) comprises a first core member (31) disposed in said barrel tube on a side of the cartridge (26) and a second core member (32) on a side of the liquid applying tip (15), said first and second core

members being aligned in a line in said barrel tube (11) and provided with opposing needle-like sharp ends inserted into said liquid material retaining member (20).

7. The liquid applying device according to claim 6 wherein said feed core (17) is made cylindrical and a diameter of said first core member (31) is designed to be larger than that of said second core member (32).

8. The liquid applying device according to any of the preceding claims wherein said liquid applying tip (15) is integrally formed with said feed core (17).

9. The liquid applying device according to any of the preceding claims wherein said liquid applying tip (15) is made of a material different from said feed core and capable of being impregnated with the liquid material.

10. The liquid applying device according to any of the preceding claims wherein said liquid material is a liquid makeup material.

11. A liquid applying device as hereinbefore described with reference to Figure 1, Figure 2 or Figure 3.